# United States Patent [19]

**Caufield**

[11] **3,777,428**

[45] **Dec. 11, 1973**


[54] **OBSERVATION SIGNAL DEVICE AND COMPONENTS THEREOF**


[76] Inventor: **Edward C. Caufield,** 9695 S. 2585 East, Sandy, Utah



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[52] **U.S. Cl.** ..... **52/146,** 40/129 R, 116/63 P, 248/121, 248/158

[51] **Int. Cl.** ..... **E01f 9/01**

[58] **Field of Search** ..... 40/129 A, 129 R, 40/125 N; 116/173, 63 P, 63 R; 94/1-5; 52/38, 27, 103, 146, 148; 248/158, 434, 171, 121, 156



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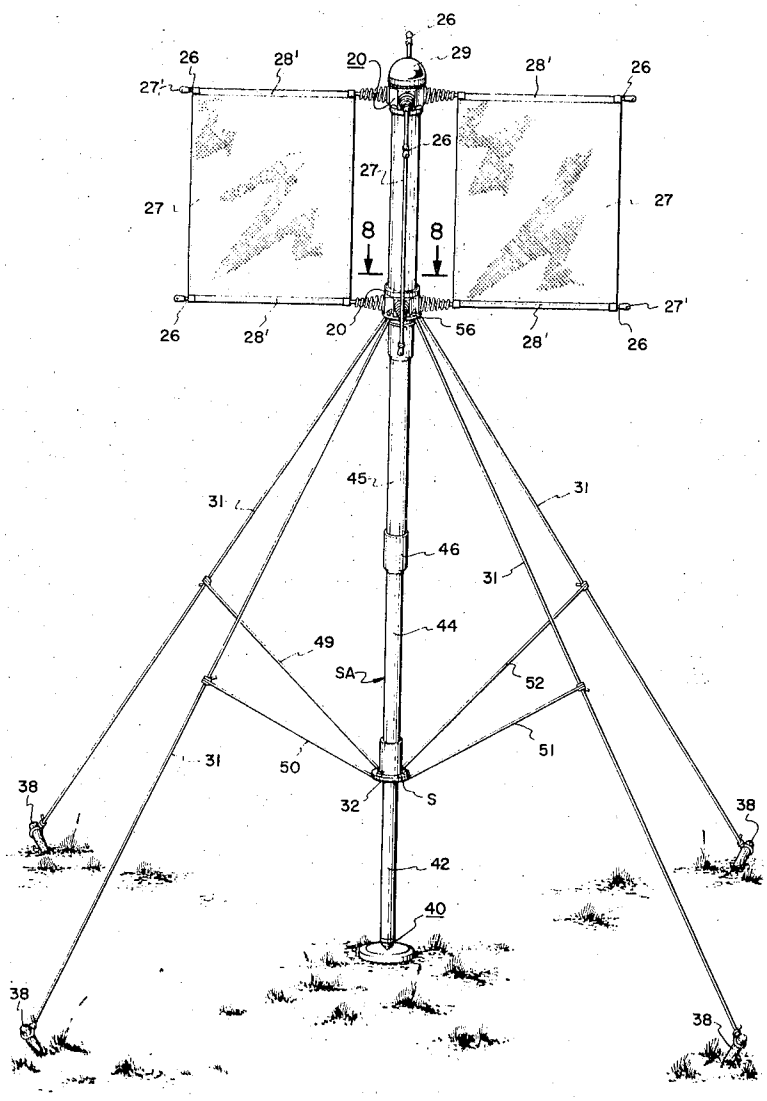
*Primary Examiner*—Price C. Faw, Jr.
*Attorney*—M. Ralph Shaffer



[57] **ABSTRACT**

Signal apparatus for use in geodetic surveys, land surveys, emergency use, and so forth. The signal apparatus comprises a panel signal wherein panels incorporated therein are constructed to facilitate windspillage in a manner such as to preclude the panel signal structure from tipping or blowing over upon the presence of excessive wind pressures. The panel structure is lightweight, a self-contained unit, and includes, preferably, flexible arm mounts constructed to mount signal panels in such a manner that these panels can "spill" or pass oncoming gusts of wind without chancing the blowing over of the structure.


**10 Claims, 15 Drawing Figures**



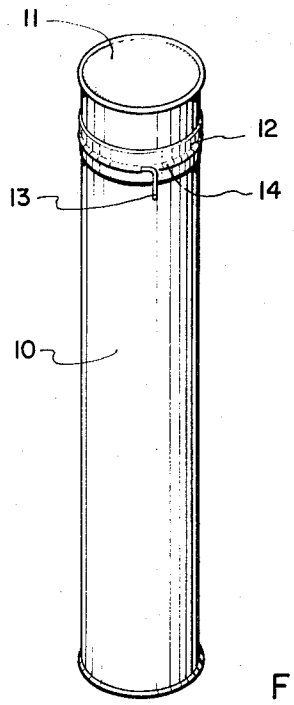



FIG. 1

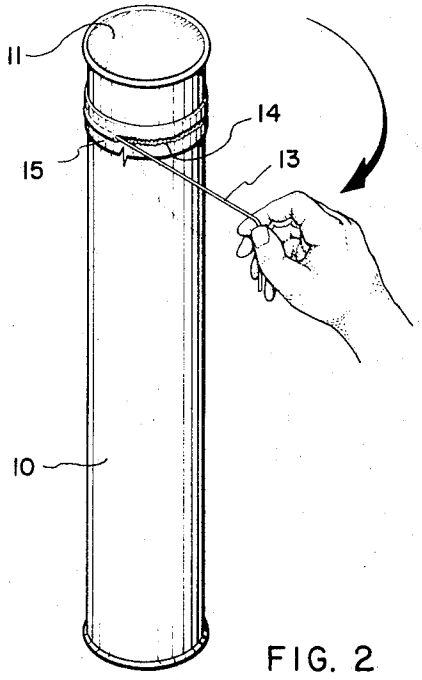



FIG. 2

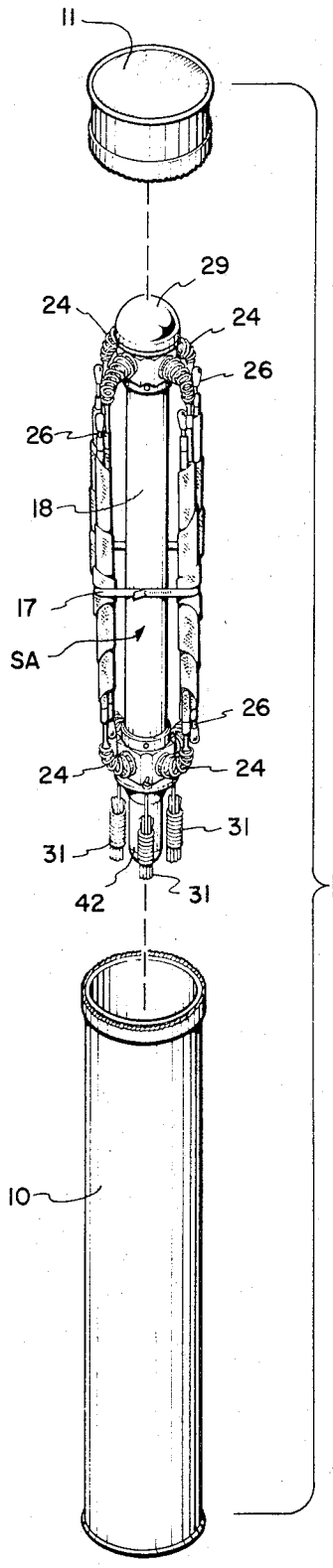



FIG. 3

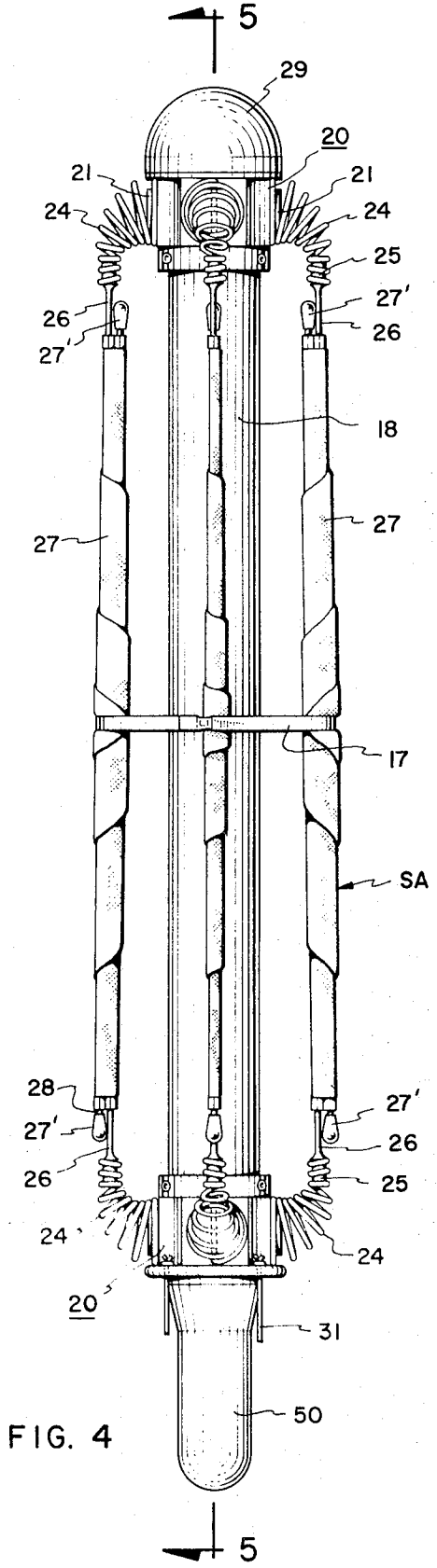

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FIG. 4

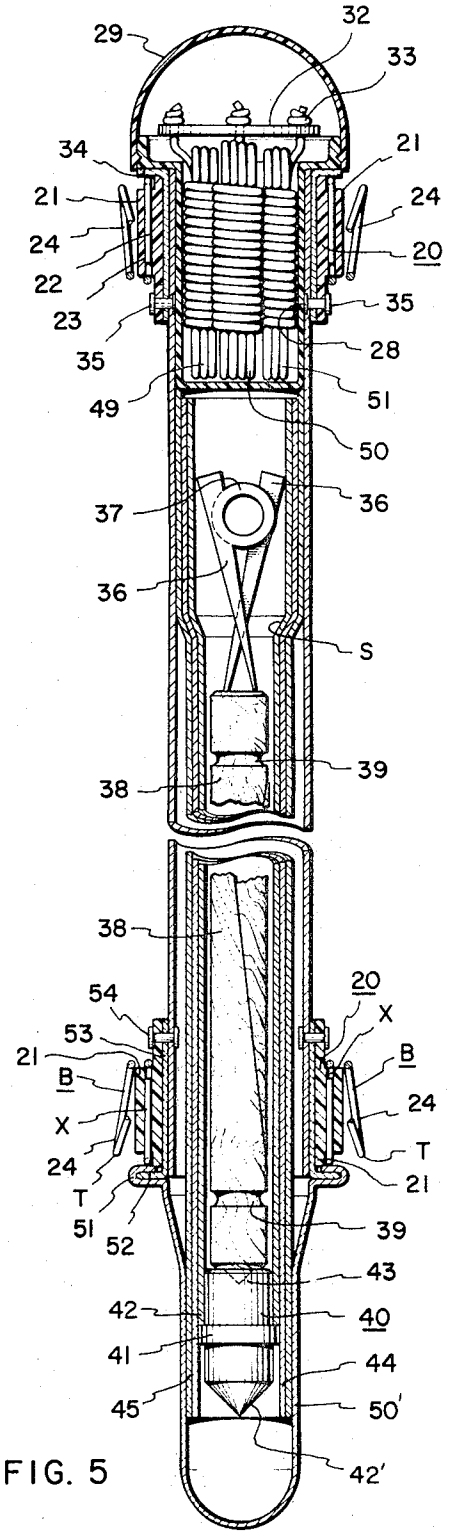

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FIG. 5

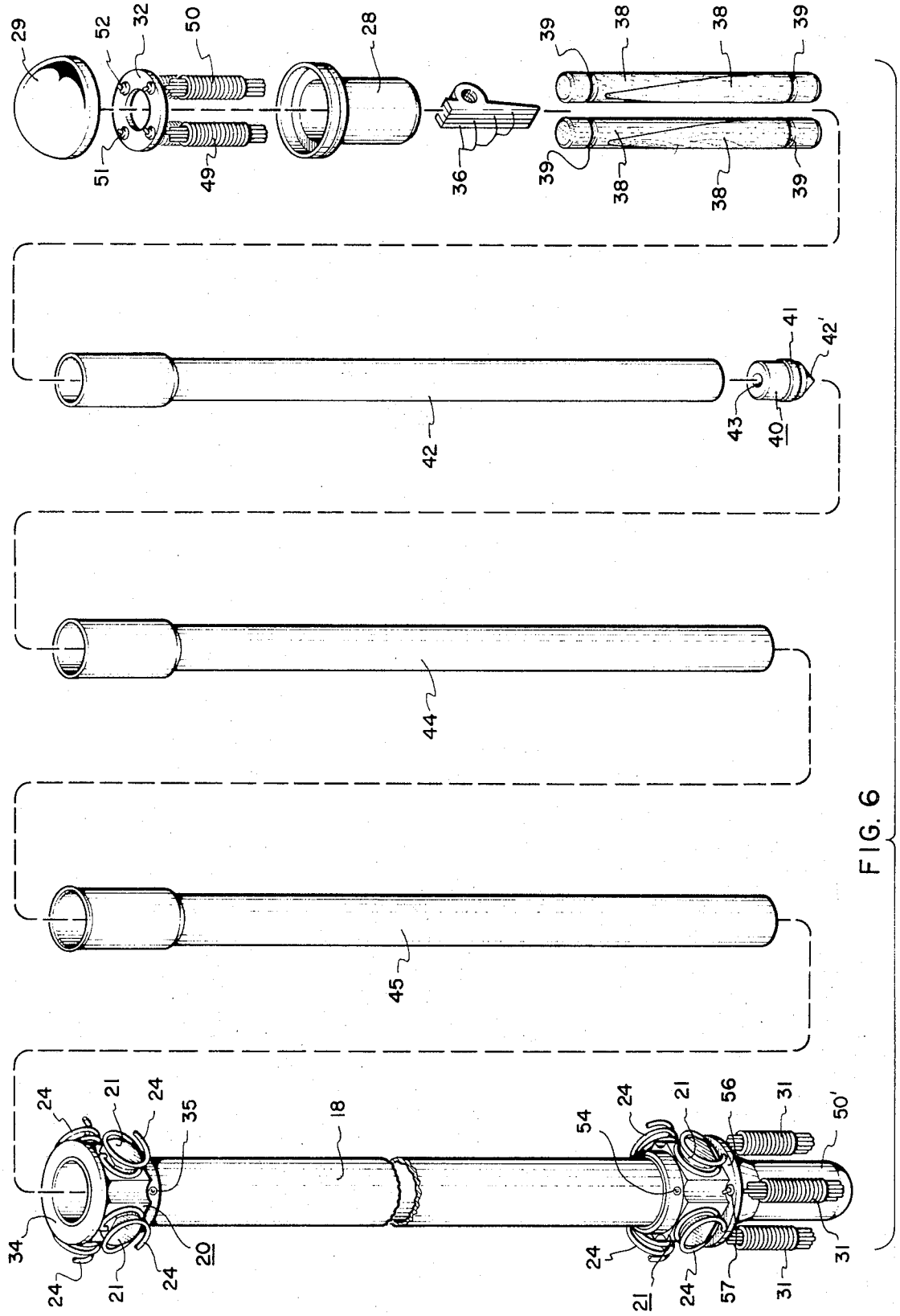

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FIG. 6

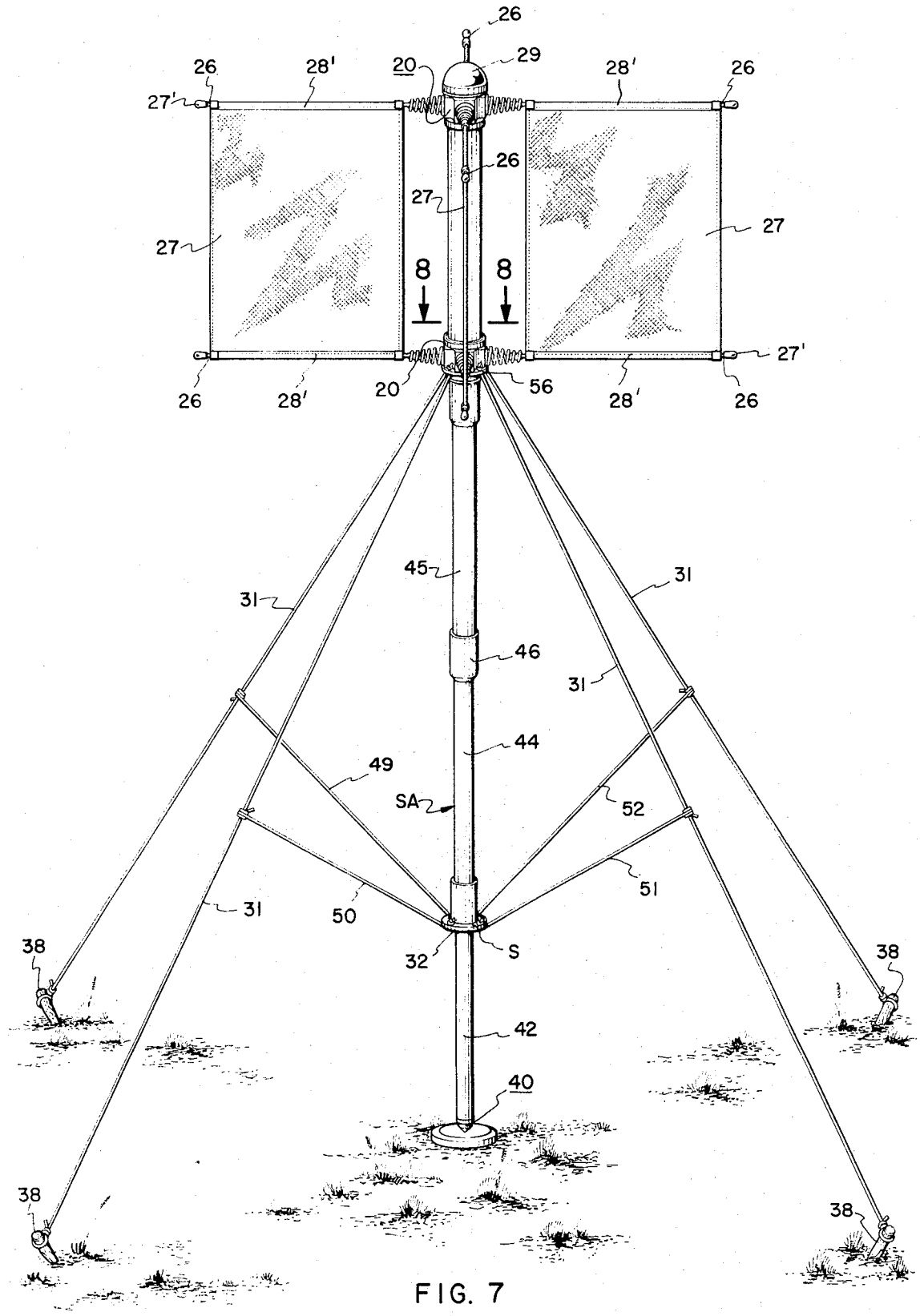



FIG. 7

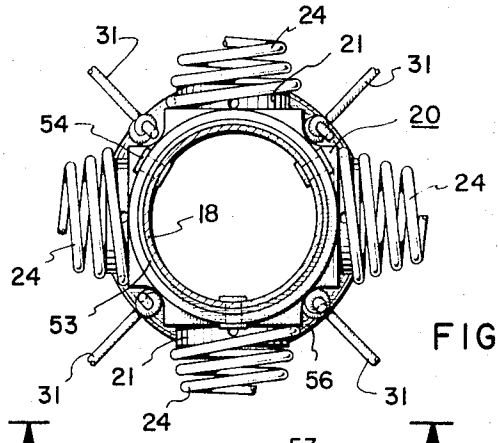



FIG. 8

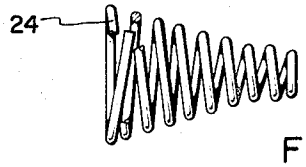



FIG. 12

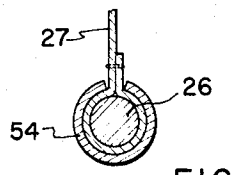



FIG. 13

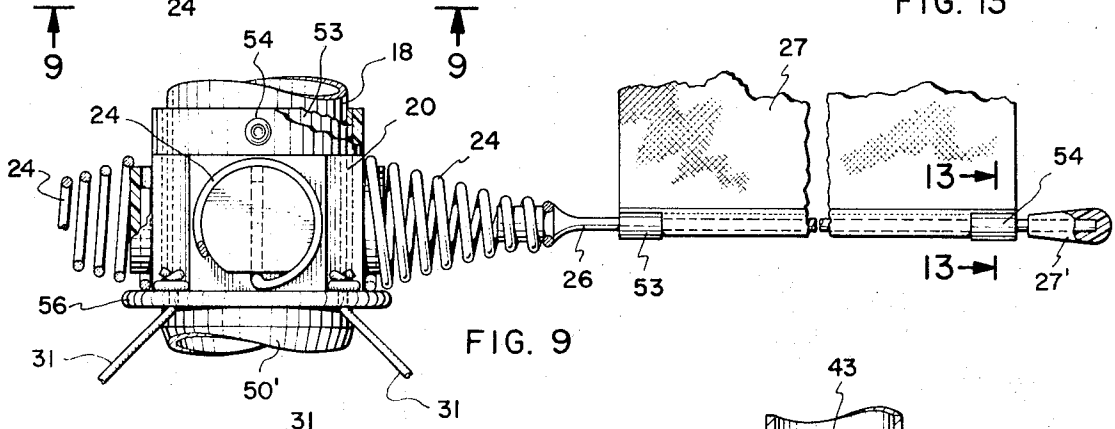



FIG. 9

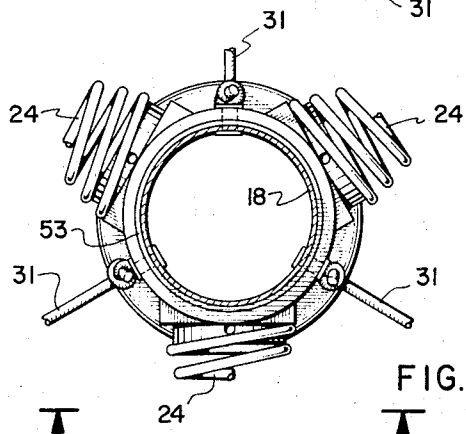



FIG. 10

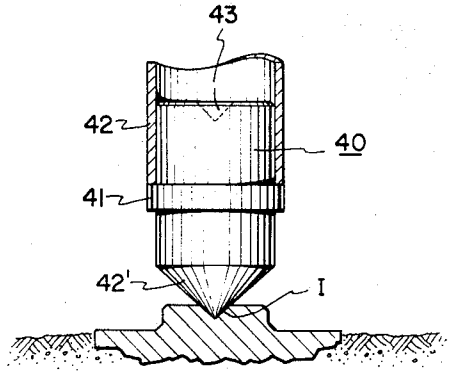



FIG. 14

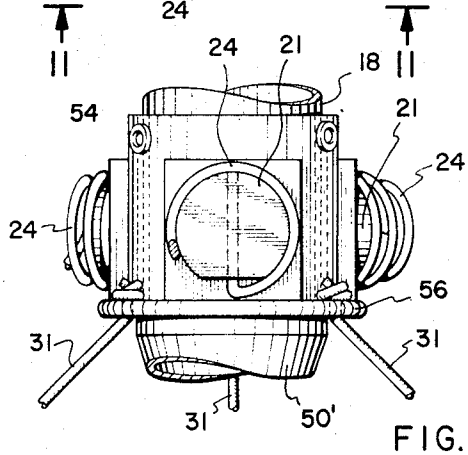



FIG. 11

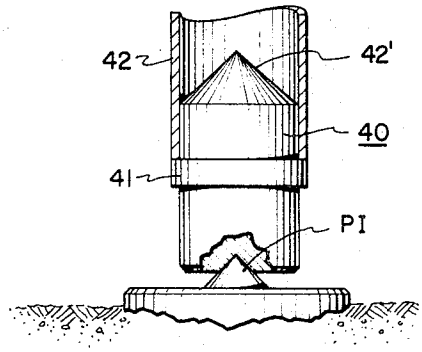



FIG. 15

# OBSERVATION SIGNAL DEVICE AND COMPONENTS THEREOF

The present invention relates to panel signals used in geodetic work, general land surveys, safety work and the like and, more particularly, a new and improved panel signal that can be very lightweight, made a self-contained unit, and have incorporated therein panel mounts adapted to "spill" oncoming gusts of wind from the outer edges or margins of the panel because of the type of panel and panel mounting construction.

For geodetic work and general land surveys, helicopters are often employed to transport bulky lumber, carpenters and other workmen to mountaineous or hilly sites for the erection of panel signals. Such panel signals are now constructed of wood, are very rigid and bulky, difficult to tie down and blow over easily during windstorms. Additional disadvantages are that such panel signals as are conventionally used require extensive materials and workmen to erect. These panel signals, so-called, are used for telescopic sighting purposes in order that a given terrain can be mapped or surveyed.

The present invention overcomes prior difficulties in that, first of all, the unit can be made principally of light-weight aluminum tubing, at least so far as the outer casing and certain other structure is concerned. Disposed within the tubing enclosure are primary, collapsed structure which is tied centrally so as to keep the panels proximate the central tubular structure. Release of the tie means automatically releases the panels such that the same spring out naturally to reveal plural panels or flags individually held in vertical condition. The rods or shafts mounting the flags to the central structure are resiliently mounted such that wind spillage is possible. This is to say, certain ones of the flags, when disposed essentially transversely to the direction of oncoming wind, will tend to deflect rearwardly slightly and also assume temporary forwardly concave configurements such that oncoming winds will be spilled off of the outer edge of the respective flags or signals.

Self-contained structure includes extension and tie-down structure such as to keep the plural-panel signal erect when mounted. The signal itself can be erected upon solid rock or simply conventional turf, sand, or soft earth. Container structure is provided for housing cable or rope ties and also is constructed to receive location information. The structure is adapted for incorporation of any number of flags or panels. The panels themselves can be numbered, uniquely colored, or contain other indicia. The subject panel signals are usable not only for general land and geodetic survey work but also by arms and defense forces, by emergency crews, and for all types of highway work.

Accordingly, a principal object of the present invention is to provide a new and improved panel signal structure.

An additional object is to provide a multiple panel signal for use in geodetic and general land survey work and for other uses.

An additional object is to provide a self-contained panel signal.

A further object is to provide a panel signal having plural panels or flags which are constructed and mounted to adapt oncoming wind pressures to spill out over the ends or outer margins of such panels.



A further object of the invention is to provide a panel signal requiring a minimum of hand manipulation for mounting to any given terrain.

A further object is to provide tie-down structure for panel signals which will operate to fixedly locate, as in a vertical position, a panel signal in any type of terrain.

A further object is to provide a panel signal wherein the visible panels will not aid oncoming wind pressures intending to tip over the structure.

The features of the present invention may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a front perspective view of the selfcontained structure when packaged and sealed preparatory to use.

FIG. 2 is similar to FIG. 1 but illustrates the structure and manner by which cap removal of the case or container of the signal device is removed.

FIG. 3 is an exploded view of the structure of FIGS. 1 and 2, illustrating a principal portion of that which is contained within the case and lid of FIGS. 1 and 2.

FIGS. 4 and 5 are front elevation and section views of a principal portion of the structure, illustrating stored tie-down structure as well as vertical lengthening structure, and also illustrating the flags or panels as being in retracted position.

FIG. 6 is a serially exploded view illustrating the stored contents of the principal flag and mounting structure of the invention.

FIG. 7 is a front elevation of the panel signal of the present invention wherein the same is erected for use.

FIG. 8 is an enlarged fragmentary top plan illustrating a representative collar structure of the panel signal wherein a four-panel system is utilized, thereby insuring that the mounting means are disposed in guadature.

FIG. 9 is a view taken along the line 9—9 in FIG. 8 and illustrates, in an extension thereof, a representative mounting at the lower margin of a represented panel to the structure.

FIG. 10 is similar to FIG. 8 but illustrates that in a three-flag or three-panel system the resilient mounting means incorporated may be disposed 120° apart.

FIG. 11 is a fragmentary view taken along line 11—11 in FIG. 10.

FIG. 12 is a side elevation of a representative spring mount used in resiliently mounting the rods or shafts supporting the individual flags.

FIG. 13 is a fragmentary section taken along the line 13—13 in FIG. 9, illustrating a particular clamping structure used to clamp the panel or flag to a respective rod mounting the same.

FIG. 14 is an enlarged fragmentary view of the bottom of the panel signal structure wherein a pointer is used to position the structure over a centering cone shaped recess.

FIG. 15 is similar to FIG. 14 but illustrates an inversion of the pointer structure such that an upstanding point may be centered underneath the panel signal to be mounted thereover.

In FIG. 1 the case 10 of the device is fitted into the interior of lid 11, and these two may be temporarily secured together by means of a tape 12. Where desired, a severing string 13 may be preliminarily wrapped about the juncture 14 as to case 10 and lid 11. Thus, the tape 12 will be wrapped over the string in the manner illustrated in FIG. 1.

As an alternative approach, there may be an enlarged label **15** disposed essentially completely over the case **10** and lid **11.** Solely the upper or right end of the label at **15** is illustrated in FIG. **2.** In any event, such a label can identify the product and also give instructions as to erection and use. Prior to the inclusion of a gummed or self-sealing label on the case, there may be preliminarily wrapped about the juncture **14** the severing string **13,** this in a manner such that the outer end of string **13** protrudes outwardly. In such event it will be easy for the user to pull in the direction of the arrow shown in FIG. **2** such that the lid **11** may be separated from case **10.**

In any event, upon opening the case **10,** as by removal of lid **11,** see FIG. **3,** it is seen that there may be withdrawn a structural assembly SA, which will now be explained. Preliminarily, it is noted that a self-locking or other type of strap **17,** made from plastic by way of example, may be used to secure inwardly, relative to tube body **18,** the four outwardly extending arms **26,** at the top of the structure, and also four arms **26,** at the lower portion of the structure. FIG. **3** illustrates a four-panel construction as will hereinafter be pointed out. It will be apparent that plural panels such as two, three or any desired number may be utilized in the construction by the general teaching of the present invention.

In any event, FIGS. **4** and **5** illustrate a collar **20** disposed at opposite ends of tube body **18.** The collar **20** includes four bosses **21** disposed in quadrature and which individually receive the spring ends **22,** at aperture **23,** of a respective tapered flexure spring **24.** There will be provided four bosses **21,** each receiving a respective flexure spring **24,** in the manner shown in FIG. **5.** The springs are shown detailed in elevation view in FIG. **4,** and merely the base portions thereof at B in FIG. **5** are illustrated. In FIG. **5** it is seen that an intermediate turn at T is angulated outwardly such that the positionment of the spring end at X, at each spring emplacement, will serve to apply a tension force to the spring member and hence aid the same in being firmly, retentively, and springingly secured within the respective boss aperture shown.

The outer end of each spring **24** is secured, as by a press fit or by solder, to the enlarged receiving end **25** of a respective arm **26.** Accordingly, since each of the springs accommodates a respective arm **26,** there will thus be provided four arms to the top of the structure, as seen in FIG. **4,** and likewise four arms to the bottom of the structure. If desired, a rounded-end or tip element **27'**, having an internal bore as at **28,** may be provided to give a rounded tip to each of the arms **26.** In any event, as the strap **17** is removed, the springs **24** will co-act together to spring outwardly and hence cause the four panels **26,** arranged in quadrature, and two of which are shown in FIG. **7,** to become vertically erect. The panels **27** may be secured to their respective arms **26,** two per panel, by means of sewn margin loop-type seams, as at **28'** in FIG. **7.**

As to the panels themselves, they may be made of screen material, cloth, or other type of materials such as a wire mesh, or even plastic

In returning to FIG. **5,** it will be seen that a container **28** is provided, the same including a cap or lid **29.** The container contains a series of individually wrapped cord lengths **49–52.** In usual constructions there would be provided four such cord lengths. The cord lengths are seen to be attached to a lower tie-down ring **32;** the cords are retained in place by knotted ends **33.** The lower tie-down ring **32** is likewise illustrated in FIG. **6.** Container **28** is likewise shown on the righthand side of FIG. **6.** Thus, the sole equipment contained by the separate container **28** will be simply the lower tie-down ring **32,** having the four separate wrapped cord lengths **49–52.** To complete the upper portion of the structure, as in FIG. **5,** there will be provided a flange **34** which is riveted in place, and also to the spring-retaining boss, by respective rivets **35.**

FIG. **5** illustrates that there are a number of items of stored equipment disposed for packing purposes within the structure **18.** Thus, there will be a series of petons or stakes **36** having their individual eyelets **37** as serving as rope tie-downs. The steel stakes or petons **36** will be used in the case where the device is to be secured to rock formations. Where ground use is contemplated, that is, where wooden stakes will suffice, then the same are supplied as at **38,** with each including a cord mounting groove **39.** Centering point element **40** is likewise provided and includes a central flange-like protuberance **41** as well as point **42'** and recess **43.** Member **40** can be either positioned as shown in FIG. **5,** or inverted, relative to lower extension tube **42,** such that when the equipment is to be installed and centered either over a point or over a dot, the equipment and especially member **40** can be used, see FIG. **7,** to properly orient the structure. Thus, either the lower tip at **40** may be employed over a dot or simply a metal marking pin or, if a point is upstanding, then the member **40** may be inverted such that the point recess **43** may be fitted over the upstanding point. Additional tubes **44** and **45** are likewise provided, with tubes **42, 44** and **45** serving as respective telescoping extensions of one another, see FIG. **7.** Thus, each of the tubular members may be constructed so that one end, i.e., the lower end of tubular member **45,** will fit into the upper end fitting extremity **46** of tubular member **44.** FIG. **7** illustrates that the lower tie-down ring **32** is preliminarily slipped over tubular member **42** and abuts against shoulder S of lower tubular member **42** so as to be retained thereat and thus prevented from being drawn upwardly. The lower tie-down ring **32** is retained in place, however, by the outwardly extending ties **49–52,** which are connected to main ties or cord lengths **31.** FIG. **7** illustrates that the wood stakes **38,** of FIG. **5,** may be utilized to secure the lower ends of the tie-down cords **31.**

Thus, FIG. **5** illustrates that the interior of tubular structure includes tie-down stakes, center point, and extension tubes **42, 44** and **45.** These are removed after container **28** is removed, as above described. Tail cone **50'** is shown to include an arcuate portion **51** which mounts over flange portion **52** of lower flange **53.** The latter is riveted in place by rivets **54** to the lower collar **20** which also includes the four plastic bosses in a manner similar to that in connection with the upper collar **20.** The tail cone flange, see **56** in FIG. **6,** is provided with a series of apertures **57** for accommodating attachment thereto by the upper extremities of cords **31.** It is seen in FIG. **3** that the cord lengths **31** are preliminarily secured to the flange **56** of tail cone **50'**.

FIGS. **14** and **15** illustrate various ways in which the equipment may be centered, as by the use of the centering means **40** shown therein. Point P1 is a ground reference point in FIG. **15.** Indentation I, in FIG. **14,** is a reference point for receiving the apex of point member **40.**

FIG. 8 is a fragmentary plan view, partially in section, illustrating the flexure springs as being in quadrature for supporting the sails. The several flexure springs at 24 are illustrated in FIG. 12. For securement of the sails, themselves, a pair of U-configured clamps as at 53 and 54 may be employed. These serve as crimping clamps which are simply crimped by pliers to secure the outer extremity of the particular sail, flag, or panel in question to desired points along respective arms 26.

FIGS. 10 and 11 illustrate an optional embodiment of the invention wherein three instead of four sails are used. In such event, the supporting springs will be disposed 120° apart so that three sails are utilized.

FIG. 13 illustrates that if desired the clamps 53 and 54 may be of round configuration so as to clampingly engage a particular sail or panel to its rod.

It should finally be added that the upper container or container 28 with cap 29 may be utilized for repositioning and to contain a message as to the survey being conducted, by way of example.

The subject equipment is highly advantageous for use for forest service, engineering surveys, geodetic surveys, general land, industrial or pipe line surveying, and also as emergency equipment for highway use, by way of example. The equipment is also ideally suited for army engineering work, hospital zoning and a variety of other uses.

The panels or sails, themselves, may include any type of emergency indicia, lettering numbers, and so on.

In operation, the lid 11 is removed from case 10, as is shown in FIG. 2, so that the central structure seen in FIG. 3 may be withdrawn. Upon such withdrawal the tape or strap 17 is removed such as to permit the sails, flags or panels 27 to become erect and disposed outwardly, as seen in FIG. 7. Actually, either before or after the removal of the tape 17, there may be withdrawn from the interior of the structure, as seen in FIG. 5, the various extension tubes, stakes, and center point 40, to effect structure erection. The base tie-down ropes or cords as at 31 in FIG. 3, are unwound and staked and, with the lower ring 32 being in place, its cords 49–52 will be tied at medial points to the various cords 31. Printed or written survey information may then be installed in container 28 and the same replaced with its lid 29.

For identification purposes, four-sail units may be used as primary markers for geodetic surveys, with three-sail units, as illustrated in FIGS. 10 and 11, used for secondary markers. This is purely optional.

For added stability the extension tubes at 42, 44 and 46 may be filled with sand, this to lower the center of gravity of the unit. While it is preferred that the sails, flags or panels be perforate, such as wire, cloth, mesh or screening, yet the same can be of a solid, nonperforate material such as plastic; in any event, under wind loads the supporting arms for each panel will distort inwardly by virtue of an inherent flexure or because of flexure mountings, such that the panels will become distorted such that wind loads may "spill" over at outer vertical extremities.

While particular embodiments of the invention have been shown and described, it will be obvious to those skilled in the art the various changes and modifications which may be made without departing from the essential features of the present invention and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. An observation signal device including, in combination, an upstanding elongate member, means for anchoring said upstanding elongate member to the ground in an upright position, plural pairs of outwardly extending, vertically spaced arms universally resiliently mounted to and extending outwardly from said upstanding elongate member, and plural observation panels respectively connected to and between respective pairs of said arms.

2. Structure according to claim 1 wherein said device includes plural universally resilient yieldable means mounted to respective ones of said arms and secured to said upstanding elongate member for enabling the ommidirectional flexure of said arms relative to said upstanding member, whereby to permit wind loads to spill off said panels.

3. Structure according to claim 2 wherein said plural yieldable means individually comprise spring mounts coiled about the axis of its respective arm.

4. An observation signal device including, in combination, an upstanding elongate member, means for anchoring said upstanding elongate member to the ground in an upright position, plural pairs of outwardly extending, vertically spaced arms mounted to and extending outwardly from said upstanding elongate member, and plural observation panels respectively connected to and between respective pairs of said arms, and wherein said upstanding member comprises a hollow tube, a container fitted in one end of said hollow tube, and means for closing the remaining end of said hollow tube, said container and said hollow tube beneath said container including interior storage chambers for signal device accessories.

5. An observation signal device including, in combination, an upstanding elongate member, means for anchoring said upstanding elongate member to the ground in an upright position, plural pairs of outwardly extending, vertically spaced arms mounted to and extending outwardly from said upstanding elongate member, and plural observation panels respectively connected to and between respective pairs of said arms, and wherein said upstanding elongate member includes an elongate hollow interior, plural fitted-together tubular members secured to and depending from said upstanding elongate member and constructed for mutual separation and telescoping storage within said hollow interior of said upstanding elongate member.

6. Structure according to claim 5 wherein said upstanding elongate member includes a depending tail cone releasably receiving an uppermost one of said tubular members.

7. Structure according to claim 5 wherein the lowermost one of said tubular members has a lower extremity closed by a centering pointer, said tubular member being constructed in the aggregate to contain weighting material.

8. Structure according to claim 5 wherein each of said tubular members includes an upper, flared, intertubular member fitting portion, said device including a ring exterior engaging a respective flared cutting portion, flexible elongate connectors secured to said ring and constructed for securement to said anchoring means, said anchoring means, in part, comprising

ground-tie cords connected to said flexible elongate connectors.

9. Signal structure having a depending tube, a reversible pointer member having a medial peripheral abutment flange, a centering apex on one end, and a solely centered centering depression at the remaining end, said pointer member being positioned in said depending tube such that said peripheral flange abuts the same.

10 A reversible pointer member having a medial peripheral flange, a centering apex at one end, and a solely centered centering depression at the remaining end.

* * * * *